



Automatic Railway Gate Controller with High Speed Alerting System

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ABSTRACT: The aim of the paper is to avoid the railway accidents happening at unattended railway gates by using ATMEGA_16 microcontroller, if implemented in spirit. The model of railway track controller is designed by using four laser light sources as transmitters and four LDR as receivers; two pair of transmitters and receivers are fixed at upside (from where the train comes) at a level higher than a human being in exact alignment and similarly the other pair is fixed at down side of the train direction. The collision of two trains due to the same track also can be happened. This model is implemented using sensor technique. We placed the sensors at a certain distance from the gate detects the approaching train and accordingly controls the operation of the gate. Also an indicator light has been provided to alert the motorists about the approaching train.

KEYWORDS: Microcontroller, IR LED, Sensor, Anti collision device, track switching.

I. INTRODUCTION

Now a days, India is the country which having world's largest railway network. Over hundreds of railways running on track every day. As we know that it is definitely impossible to stop the running train at immediate is some critical situation or emergency arises. Train accidents having serious consequence in terms of loss of human life, injury, damage to Railway property. Railway safety is a crucial aspect of rail operation over the world. Railways being the cheapest mode of transportation are preferred over all the other means. When we read newspaper, we come across many railway accidents occurring at unmanned railway crossings. This is mainly due to the carelessness in manual operations or lack of workers. This model deals with two things. Firstly, it deals with the reduction of time for which the gate is being kept closed. And secondly, to provide safety to the road users by reducing the accidents that usually occur due to carelessness of road users and at times errors made by the gatekeepers. To avoid the accidents, sensors placed at some distance from the gate detect the departure of the train. The signal about the departure is sent to the microcontroller, which in turn operates the motor and opens the gate. Thus, the time for which the gate is closed is less compared to the manually operated gates since the gate is closed depending upon the telephone call from the previous station. Also reliability is high, as it is not subjected to manual errors. The concept of the model is to control the railway gate using microcontroller or anti-collision technique.

II. OPERATION

The operation of the circuit can be clearly explained as follows. Basically the circuit consists of four IR LED Photodiode pairs arranged on either side of the gate such that IR LED and photodiodes are on either side of the track as shown in the figure below.

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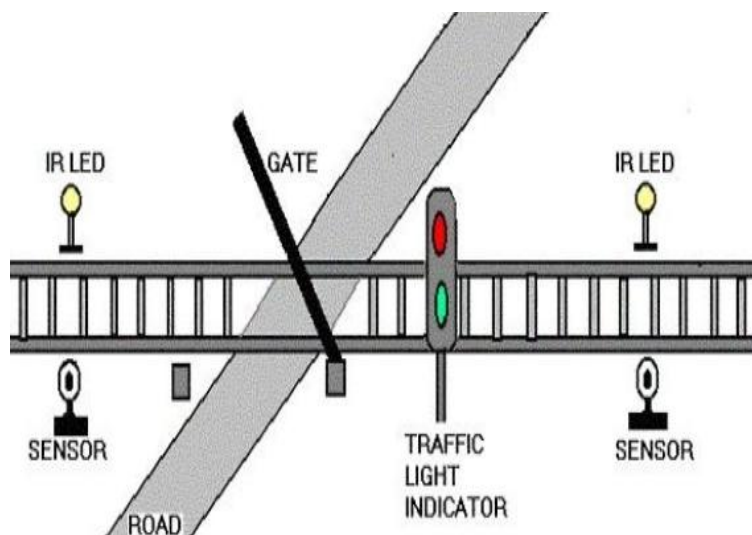


Fig. 1: Railway Gate Controller

Initially transmitter is continuously transmitting the IR light which is made to fall on the receiver. When the train arrives it cuts the light falling on receiver. Let us assume the train is arriving from left to right, now when the train cuts the 1st sensor pair a counter is activated and when it crosses 2nd sensor pair the counter is stopped. This counter value gives the time period which is used to calculate the velocity of the train. The sensor2 output is sent to microcontroller which makes the relay activate which causes the gate to be closed. Now when the last carriage of the train cuts the sensor4 microcontroller de-activates the relay and gates are opened.

III. PIN DIAGRAM & CIRCUIT DIAGRAM

The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed.

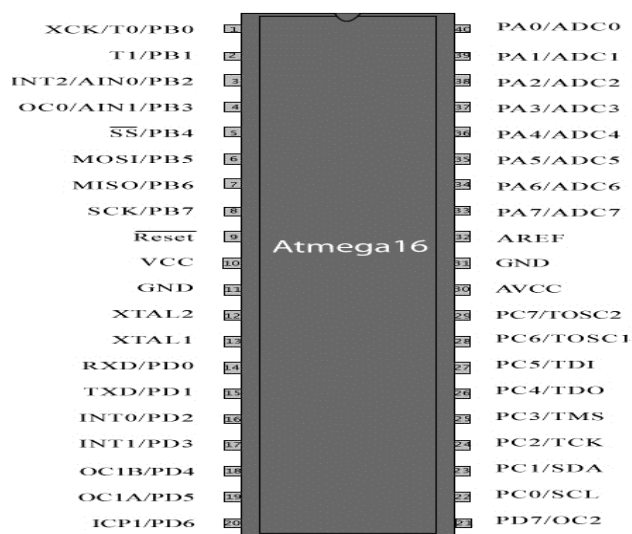


Fig. 2 PIN Diagram of ATMEGA-16

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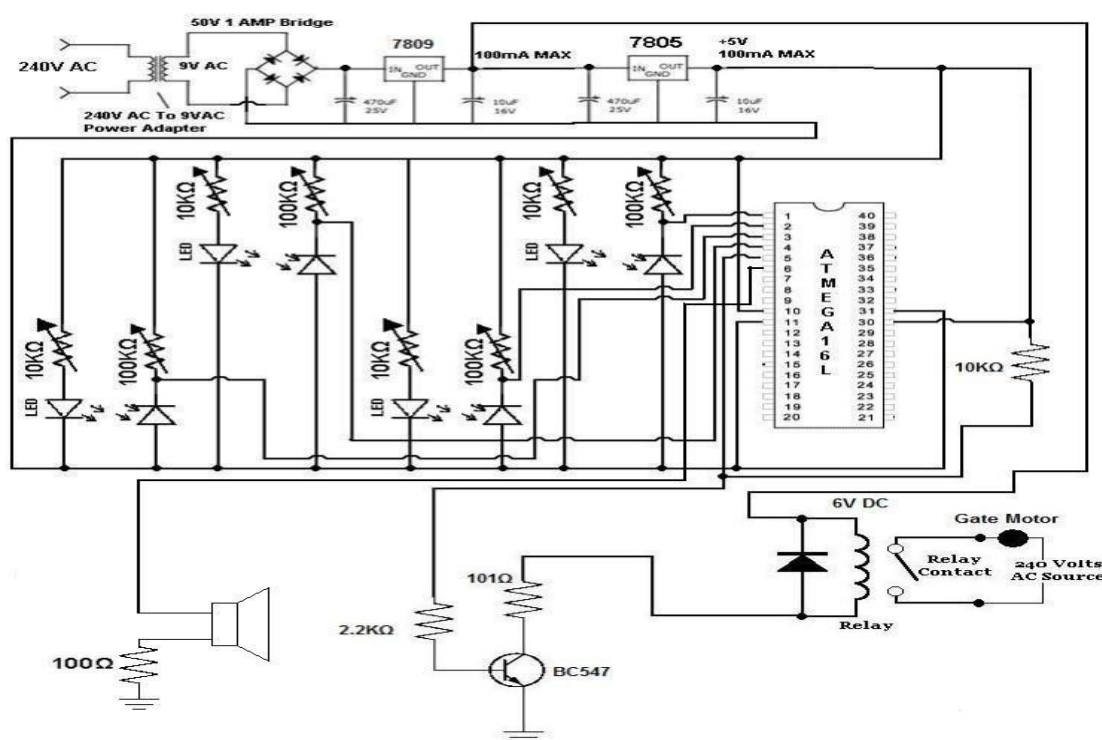


Fig. 3 Circuit Diagram

IV. WORKING PRINCIPLE

Here the counter value is used to calculate the velocity of the train, which means that every wheel of the carriage cuts the sensor pair within small fraction of time based on its velocity. After the last carriage is passed there is no obstacle to the sensor pair within that fraction of time hence it knows that the train has left.

One more feature of this circuit is detecting a train accurately i.e, there may be a chance that some obstacle (for e.g some animal) may cut the sensor then in such a case the counter is made to run for certain period of time (this time period is set considering the possible lowest speed of train) if the obstacle does not cut the 2nd sensor before this predefined time then this obstacle is not considered as train and gates remain opened.

One more advantage of calculating the velocity of train is, if the speed of the train crosses a limit i.e, if it travel's at an maximum speed then the passengers are alerted using a by activating a buzzer.

The system basically comprises two IR LED–Photodiode pairs, which are installed on the railway track at about 1 meter apart, with the transmitter and the photodiode of each pair on the opposite sides of the track. The installation is as

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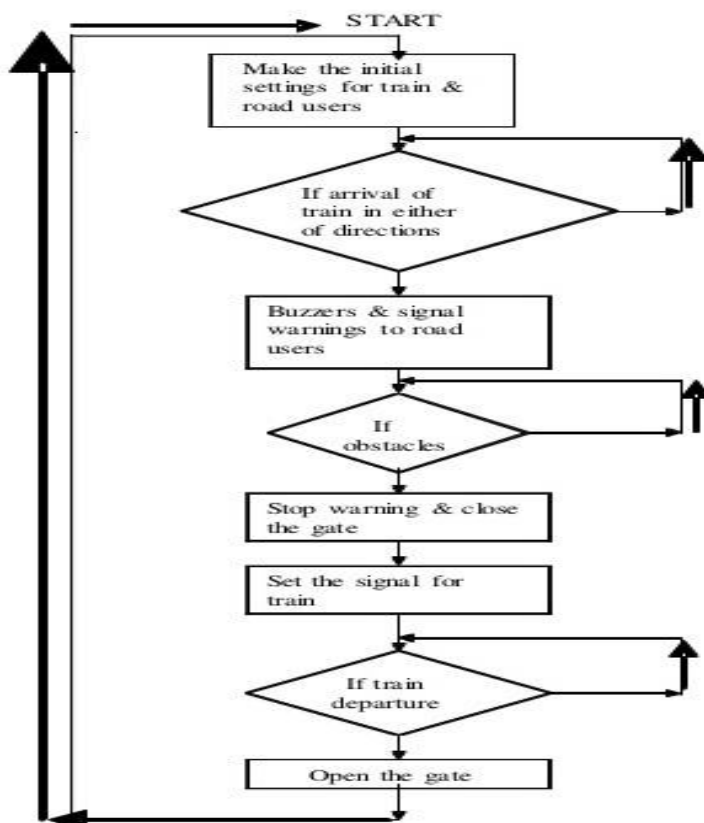
shown in the block diagram. The system displays the time taken by the train in crossing this distance from one pair to the other with a resolution of 0.01 second from which the speed of the vehicle can be calculated as follows:

$$\text{Speed (km/h)} = \text{Distance/Time}$$

This circuit has been designed considering the maximum permissible speed for trains as per the traffic rule. The microcontroller is used to process the inputs that are provided by the sensors and generate the desired outputs appropriately.

V. FLOW CHART

A pair of IR LED is used at aft side and both the IR LEDs are illuminated continuously by laser lights. The same arrangement is made at the foreside. A pair of IR LED and laser light is used as sensor. When train comes from aft side and the beam of light falling on both the IR LEDs are disturbed by the train then only a signal goes to the micro controller and then micro controller is activated and the program installed in the controller memory is executed. After receiving signal from aft side sensor, micro controller activates buzzer alarm. Buzzer remains active for 2 sec so that people find time to clear the gate. After 2 sec the gate across the road is closed with the help of servo motor and a red signal at the road for the passengers is activated. The gate and the signals are controlled by the instructions stored in the controller. After crossing the gate area when the train reaches to the foreside sensor and the light falling on both the IR LED are disturbed then it sends a signal to the controller. Then controller again executes the instructions to lift up the gate and change the signal to green.





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VI.CONCLUSION

This paper is suitably fulfilled the basic things such as avoidance of accidents inside the gate and the avoidable of a gatekeeper. It avoids the railway accidents and provides safety. We have seen little improvement in railway accidents. We also observed stronger safety records in certain areas and believe they are the result of constant efforts to improve safety. We demonstrate that it is possible to improve the overall safety of the railway system in India. We believe that success depends on both the railway industry and the regulator working together to achieve that common goal. The proposed system provide the means for real time inspection, review and data collection for the purpose of maintenance on the movable and fixed facilities for the guarantee of operation safety and maintenance efficiency as well as the safety appraisal decision-making system based on the share of safety data..

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